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HIGH SURVIVAL AND HOMING RATE OF HAND-REARED WILD-STRAIN MALLARDS

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Abstract: In the summer of 1970, 618 (329 males and 319 females) hand-reared wild-strain mallards (*Anas platyrhynchos*) were banded and released at the Arrowwood National Wildlife Refuge, Edmunds, North Dakota. The females were also marked with numbered nasal saddles. Liberation was by the gentle release method, and no special effort was made to isolate or condition the ducklings prior to release. Ducklings were placed in an enclosed pond area at 25 to 45 days of age. Altogether, 627 (97 percent) ducklings reached flight age and dispersed gradually into the wild. All had left the release area by 23 November. First-year band recovery reports indicated that 68 (11 percent) of the birds were shot in 15 states. Their migration pattern was similar to that for immature wild mallards banded in North Dakota in 1970.

Eighty-nine (33 percent) of a possible 270 marked females returned to Arrowwood Refuge during 1971. When consideration is given to assumed normal natural mortality and crippling loss, an estimated minimum of 43 percent of the surviving females returned to the release area. Returning birds not observed would raise this figure even higher. This potential homing rate is considerably higher than rates reported for other studies using various strains of mallards. Numerous observations of nests and broods indicated that breeding behavior and nesting success were similar to those of wild mallards in the area.

The success of this release is attributed to the inherent capability of hand-reared, wild-strain mallards to revert to their wild behavior, and to the high survival to flight age and first fall migration afforded by the gentle release in a sanctuary area. Indications are that releases of this type under the described conditions can be used to increase the breeding population of mallards in a local area.

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Liberating hand-reared waterfowl to establish or supplement local breeding populations has been advocated by many, including Pirie (1935), McCabe (1947), Foley (1954), Hunt and Smith (1960), and Borden and Hochbaum (1960) and has received qualified rejection by others, including Lincoln (1934), Brakhage (1953), Hunt et al. (1959), and Bednarik and Hanson (1965). Survival of mallards released into the wild is described by Benson (1939) and Kiel (1970).

Most of these studies dealt with domestic or semidomestic strains of mallards in which the observed survival and homing was low. Better success was achieved in gentle-release studies by Brakhage (1953) involving wild-strain mallards and by Doty and Kruse (1972) involving wild-strain wood ducks (*Aix sponsa*) at Arrowwood National Wild-

life Refuge in 1968. In view of the scarcity of information but encouraging success achieved from releases of this type, it was decided to conduct further studies with wild-strain mallards, incorporating the best features of the previous studies and several additional features. Emphasis was placed upon assessing the migration, homing, and nesting of the released birds.

We acknowledge the assistance of personnel at the Arrowwood National Wildlife Refuge in caring for the ducklings, and of various personnel of the Northern Prairie Wildlife Research Center: R. A. Madison and Karl L. Hansen in banding, marking and other aspects of the study; Paul F. Springer for editorial assistance; and Harvey K. Nelson and George V. Burger for providing encouragement and help in planning the study.

STUDY AREA AND METHODS

The release of hand-reared wild-strain mallards was made at the headquarters area of the Arrowwood Refuge. This refuge was established in 1935 on 6139.5 hectares of prairie grassland intermingled with lakes, marshes, and farmland along a 25.7-km stretch of the James River in east-central North Dakota. Only short segments of natural river channel remain among four large impoundments on the floor of the river valley. Tree growth is limited to a narrow band along the perimeter of the lakes and river.

The birds were hatched in incubators at the Northern Prairie Wildlife Research Center over a 40-day period. The eggs came from clutches produced by a captive flock of wild-strain mallards at the Center and from clutches salvaged in the wild. Newly hatched ducklings were placed in brooders containing infrared heat lamps, starter mash, and water, and were kept there for 8 to 12 days before being moved to 2.1- by 11.0-m outside pens. The birds were transported to the Arrowwood Refuge at from 25 to 45 days of age and all were banded before being placed in the release pen. Females were also marked with white plastic nasal saddles, each individually identified with black numerals. After liberation into the release pen the ducklings were not handled again except for those that were retrapped the next summer.

The release pen consisted of an open-topped, 0.2-hectare, woven-wire enclosure located near the shore of Arrowwood Lake in the refuge headquarters area. It contained a 18.3- by 30.5-m pond which was 0.6 m deep and contained a small island. Grower pellets and grain were provided in poultry feeders in the release pen throughout the summer and fall. Dense vegetation within the release pen and on the island provided protective cover, and supplement-

tary natural foods were available from the pond and the vegetation. Mammalian predators were controlled on the outside perimeter of the release pen site by live trapping and removal.

Thus, control over the ducklings lessened progressively from indoor brooders to outdoor pens and finally to the partly controlled environment of the release pen. Final liberation was achieved when the ducks were able to fly out of the release pen. No attempt was made to isolate the ducklings from human activity.

Observations of released birds were made at the refuge from the summer of 1970 through the fall of 1971. Observations in the spring and summer of 1971 were made with 20× spotting scopes from blinds located at the release pen. No special effort was directed toward locating nests or broods; however, observations of these were made by refuge personnel while conducting routine refuge work.

In order to catch and identify marked females which had lost their nasal saddles, bait trapping was conducted from 7 to 19 October 1971. Wheat and shelled corn were used in the release pen for several days before funnel traps were set over the baited area.

RESULTS

Flight and Migration

Of the 648 young ducks moved from the Center to the refuge, 21 died in the release pen from various causes. The remaining 627 ducks (306 females and 321 males) survived to flight age.

Flight was first noted on 20 July when the oldest group was 55 days old. By mid-August, groups of marked mallards were seen at different locations up to 2.4 km from the release site. The last group reached flight stage by early September.

In September and October, large groups of marked birds were noted feeding on mud flats and the shorelines of Arrowwood Lake in the vicinity of the release pen. During mornings and evenings throughout the fall, many marked birds continued to utilize the feed provided in the release pen. The majority of the marked birds had left the refuge by late October and early November. Seven marked birds seen on 23 November constituted the last observation in 1970.

Band Recoveries

The earliest direct band recovery reported by hunters was from the vicinity of the refuge on 4 October and the latest was from Arkansas on 30 January 1971. The percentages of direct recoveries by states are shown in Figure 1. This distribution pattern indicates that 68 released birds migrated along the same routes as 13 immature wild mallards banded in North Dakota in 1970. Brakhaage (1953) reported no major differences in departure dates, migration patterns, and rate of progress down the flyway between hand-reared and wild mallards.

The direct recovery rate by hunters for released birds (0.107) was not significantly different ($P > 0.10$) from that for the immature wild mallards (0.071). No significant difference ($P > 0.10$) was noted in the recovery rates of hand-reared (0.102) and wild (0.106) males, but there was a significant difference ($P < 0.05$) in the recovery rates of hand-reared (0.113) and wild (0.034) females. We believe the difference in recovery rates in the females may be due in part to a higher band reporting rate for birds with markers.

Lincoln (1934) concluded from band recoveries that hand-reared, game farm mallards did not disperse from the point of release and had a poor survival rate. Errington and Albert (1936) cited a similar

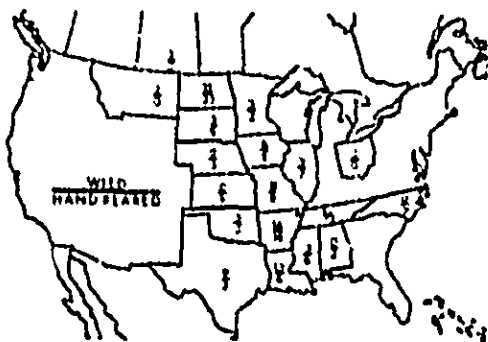


Fig. 1. Percentage of direct recoveries of immature wild and hand-reared mallards banded in North Dakota in 1970.

failure of game farm mallards to migrate. Brakhaage (1953) found that local mortality of hand-reared, wild-stock mallards was 40 percent higher than that of wild mallards and that mortality was consistently higher for hand-reared than for wild-trapped ducks of other species also. Foley (1954) was optimistic about New York's program for establishment of waterfowl released as ducklings. He found that, of six species released, survival to flight age and subsequent return as breeders the following year was sufficient to repopulate some depleted nesting areas.

Survival and Homing

In the spring of 1971, returning females were first seen on 7 April. Observations became common by 10 April when six marked females were noted on Arrowwood Lake in the vicinity of the release pen. A minimum of 89 out of a possible 270 marked females returned to the refuge during 1971 (Table 1). This is a potential homing rate of 33 percent. If we assume a crippling loss of 25 percent and a nonhunting mortality of 20 percent (Geis et al. 1969), the estimated minimum survival (homing) rate is 43 percent. We feel 43 percent is minimal since 13 (46 percent) of the 28 marked females

Table 1. Fate and homing of female hand-reared mallards released at Arrowwood Refuge in 1970.

	NUMBER	NUMBER REMAINING
Females banded	319	310
Total losses in release pen	13	300
Hunting mortality	30	270
Assumed crippling loss (25%)	12	258
Assumed nonhunting mortality (20%)	52	206
Birds assumed alive to return in spring	200	
Birds observed returning	89	
Percent returning	43	

trapped in the fall of 1971 were not previously observed during the spring and summer.

All marked females were paired when they returned in the spring. In only one instance was a banded drake observed with a marked female, indicating that most pairing was with wild drakes. The pairs were wary and easily flushed, making observation of marker numbers difficult. The birds were well distributed on the refuge and generally came to the release pen only in early morning or late evening to feed on grain placed there. Only a few pairs would enter the pen at one time, and if the markers had not been numbered, we probably would have concluded that only about 15 females returned. At other times of the day no marked females were present in the pen.

Sowls (1955) found that 5 percent of 20 hand-reared female mallards and 13 percent of 115 hand-reared female pintails returned the following spring to the marsh where they were released. Sellers (1973) found that approximately 25 percent of 521 wild-stock female mallard ducklings released at about 5 weeks of age in pothole habitat near Minnedosa, Manitoba in 1969 returned in 1970 to breed on or within 8.0 km of the 10.4-km² release area.

Table 2. Mallard breeding population data for Arrowwood Refuge 1967-72.

Year	Pairs	Young Produced
1967	133	290
1968	90	377
1969	158	751
1970	190	612
1971	351	1,184
1972	185	301

Nesting Behavior and Success

The first egg laying was noted on 26 April. Seventeen nests were found during the spring and summer of 1971. The nests were located as follows: seven on two islands in Arrowwood Lake, two in the release pen, three near the release pen, three in artificial nesting structures, and two on upland sites some distance from the release pen. The upland nests were in vegetative types normally used by wild mallards at the refuge. Thirty-five percent of the nests hatched. Hatching success was highest for nests on islands and lowest for nests on upland.

Thirteen observations of marked females with ducklings, representing a minimum of eight different broods, were made up to 3.2 km from the release site. The average number of ducklings in these broods was similar to that for 40 wild mallard broods observed on the refuge. In most instances marked females and their broods were seen in places also being used by wild mallards with broods. The behavior of marked females with broods was similar to that of the wild birds, and ducklings raised by marked females survived as well as those raised by wild hens.

Arrowwood Refuge has a history of supporting wild breeding mallards so the release in 1971 supplemented an established population. Both the number of mallard breeding pairs and young produced in-

creased substantially in 1971 (Table 2) but decreased again in 1972. The increase in 1971 was probably only partially a response to the 1970 release since other management techniques have been applied on the refuge in recent years to make the area more attractive to breeding waterfowl. The decline in 1972 was due in part to poor habitat conditions which resulted in reduced breeding duck densities and production on and in the general area of the refuge.

DISCUSSION

The homing of these hand-reared mallards and the similarity of their behavior to that of wild birds suggest that this type of program can be used to increase the breeding population of mallards in a local area. It is interesting to speculate as to the factors which contributed to this apparently successful release. The genetic capability of the wild stock may be important in achieving normal migration and homing and a general reversion to wild behavior. The gentle release method provided food and protection from predators up to flight age. After achieving flight capability, the birds returned frequently to the release pen to feed and changed gradually to natural foods. Finally, release into the large sanctuary area provided security from hunting in the area of release during much of the fall, and also enabled the released birds to mingle with a large concentration of wild mallards.

The costs of producing and releasing wild-strain mallards by the methods used in this experiment are undoubtedly higher than for the more conventional type of releases of game birds at 3 or 4 weeks of age. Wild-strain mallards can be expected to produce less than half as many eggs as a flock of game farm birds. Considering only the direct expenses of an operational program (labor, feed, materials, etc.), we esti-

mate the cost to produce a wild-strain mallard to flight age at from \$1.50 to \$3.00 depending on the size of the operation and other factors. While the gentle release of wild-strain mallards may be more expensive, the increased costs are probably offset by the better survival and general performance in the wild.

Additional research on propagation and release methods is contemplated. While no effort was made to shield the released mallards from human activity, isolation and various types of behavioral and other conditioning may have enabled even better survival in the wild. The role of genetic capability of stock, natural food supply, and predation in relation to the success of a release also needs further study.

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